

WASTE STREAM	3M08	Active Effluent Ion Exchange Material
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SITE Heysham 2

SITE OWNER EDF Energy Nuclear Generation Ltd (EDFE NGL)

WASTE CUSTODIAN EDF Energy Nuclear Generation Ltd (EDFE NGL)

WASTE TYPE ILW

WASTE VOLUMES

	Reported (m ³)	OR	Conditioned (m ³)	Packaged (m ³)
Stocks:	At 1.4.2025 = 3.9			
Future arisings:	1.4.2025 - 31.3.2026 = 0.1			
	1.4.2026 - 31.3.2027 = 0.1			
	1.4.2027 - 31.3.2028 = 0.1			
	1.4.2028 - 31.3.2029 = 0.1			
	1.4.2029 - 31.3.2030 = 0.1			
	1.4.2030 - 31.3.2031 = 1.0			
	1.4.2031 - 31.3.2032 = 1.0			
Total future arisings:	2.5			
Total waste volume:	6.4			

Number of waste packages in stock: At 1.4.2025..... - packages

Comment on arising rates: Waste volumes will be variable depending on station operating conditions.

Additional information on quantities: -

Uncertainty factors on volumes: Stock (upper): x 1.50 Arisings (upper): x 1.50
Stock (lower): x 0.50 Arisings (lower): x 0.50

WASTE SOURCE Spent Ion Exchange materials. There may be traces of sludge associated with the ion exchange material.

PHYSICAL CHARACTERISTICS

General description: The waste is expected to be IRN 150L polystyrene bead ion exchange material of particle size range 0.3 - 1.2 mm. There are no large items which may require special handling.

Changes since waste generated: -

Bulk density (t/m³): ~ 1.1

Comment on density: -

CHEMICAL COMPOSITION

General description and components (%wt): Proprietary ion exchange materials (~35% bone-dry wt), water (absorbed plus interstitial ~65% wt) and possibly traces of sludge. The proprietary ion exchange material normally used is expected to be an organic bead resin (polystyrene cross linked with divinyl benzene), (IRN 150L).

Chemical state: -

Sheet metal proportion / thickness: -

Metals and alloys (%wt):

	(%wt)	Type(s) / Grades(s) with proportions	% of total C14 activity
Stainless steel.....	NE	-	
Other ferrous metals.....	NE	-	
Iron.....	NE	-	
Aluminium.....	NE	-	
Beryllium.....	NE	-	
Cobalt.....	NE	-	
Copper.....	NE	-	
Lead.....	NE	-	
Magnox/Magnesium.....	NE	-	
Nickel.....	NE	-	
Titanium.....	NE	-	
Uranium.....	NE	-	
Zinc.....	NE	-	
Zircaloy/Zirconium.....	NE	-	
Other metals.....	NE	-	

Organics (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Total cellulose...	= 0	-	
Paper, cotton...	= 0	-	
Wood...	= 0	-	
Halogenated plastics...	= 0	-	
Total non-halogenated plastics...	= 0	-	
Condensation polymers...	= 0	-	
Others...	= 0	-	
Organic ion exchange materials...	~ 100.0	-	
Total rubber...	= 0	-	
Halogenated rubber...	= 0	-	
Non-halogenated rubber...	= 0	-	
Hydrocarbons...	= 0	-	
Oil or grease...	-	-	
Fuel...	-	-	
Asphalt/Tarmac (cont.coal tar)...	-	-	
Asphalt/Tarmac (no coal tar)...	-	-	
Bitumen...	-	-	
Others...	-	-	
Other organics...	NE	-	

Other materials (%wt):

	(%wt)	Type(s) and comment	% of total C14 activity
Inorganic ion exchange materials...	= 0	-	
Inorganic sludges and flocs...	NE	-	
Soil...	= 0	-	
Brick/Stone/Rubble...	= 0	-	
Cementitious material...	= 0	-	
Sand...	~ 0	-	
Glass/Ceramics...	-	-	
Graphite...	= 0	-	
Desiccants/Catalysts...	= 0	-	
Asbestos...	= 0	-	
Non/low friable...	-	-	
Moderately friable...	-	-	
Highly friable...	-	-	
Free aqueous liquids...	NE	-	
Free non-aqueous liquids...	= 0	-	
Powder/Ash...	= 0	-	

COMPONENTS OF MATERIALS, WASTE PROPERTIES, MATERIALS NOT CONTRIBUTING TO MASS

Inorganic anions (%wt):

	(%wt)	Type(s) and comment
Fluoride...	NE	-
Chloride...	NE	-
Iodide...	NE	-
Cyanide...	= 0	-
Carbonate...	NE	-
Nitrate...	NE	-
Nitrite...	NE	-
Phosphate...	NE	-
Sulphate...	NE	-
Sulphide...	NE	-

Materials of interest for waste acceptance criteria:

	(%wt)	Type(s) and comment
Combustible metals...	= 0	-
Low flash point liquids...	= 0	-
Explosive materials...	= 0	-
Phosphorus...	= 0	-
Hydrides...	= 0	-
Biological etc. materials...	-	-
Biodegradable materials...	= 0	-
Putrescible wastes...	= 0	-
Non-putrescible wastes...	= 0	-
Corrosive materials...	= 0	-
Pyrophoric materials...	= 0	-
Generating toxic gases...	= 0	-
Reacting with water...	= 0	-
Higher activity particles...	P	May be present
Soluble solids as bulk chemical compounds...	= 0	-

Hazardous substances / non hazardous pollutants:

	(%wt)	Type(s) and comment
Acrylamide.....	NE	-
Benzene.....	NE	-
Chlorinated solvents.....	NE	-
Formaldehyde.....	NE	-
Organometallics.....	NE	-
Phenol.....	NE	-
Styrene.....	NE	-
Tri-butyl phosphate.....	NE	-
Other organophosphates.....	NE	-
Vinyl chloride.....	NE	-
Arsenic.....	NE	-
Barium.....	NE	-
Boron.....	NE	-
Boron (in Boral).....		-
Boron (non-Boral).....		-
Cadmium.....	NE	-
Caesium.....	NE	-
Selenium.....	NE	-
Chromium.....	NE	-
Molybdenum.....	NE	-
Thallium.....	NE	-
Tin.....	NE	-
Vanadium.....	NE	-
Mercury compounds.....	NE	-
Others.....	NE	-

Complexing agents (%wt):

Not yet determined		
	(%wt)	Type(s) and comment
EDTA.....	NE	-
DPTA.....	NE	-
NTA.....	NE	-
Polycarboxylic acids.....	NE	-
Other organic complexants.....	NE	Possibly in trace quantities.
Total complexing agents.....	NE	-

Physical components:

	Number	Type(s) and comment
Sources.....	= 0	-
Electronic & Electrical Equipment (EEE)		-
EEE Type 1.....		-
EEE Type 2.....		-
EEE Type 3.....		-
EEE Type 4.....		-
EEE Type 5.....		-

TREATMENT, PACKAGING AND DISPOSAL

Planned on-site / off-site treatment(s):

Treatment	On-site / Off-site	Stream volume %
Size reduction Decay storage Low force compaction Supercompaction (HFC) Incineration Drying/dewatering/liquid separation Tie down/fixatives/strippable coating/painting application Decontamination Metal treatment Recycling / reuse Thermal treatment, including vitrification Encapsulation Polymer encapsulation Other physical treatment Other chemical treatment Containerisation Treatment not yet determined None	On-site	~ 100.0

Comments on planned treatments:

-

Conditioning method:

-

Conditioning plants:

Plant Name	Location
Heysham 2 Operational Waste Processing Facility (OWPF)	Heysham 2

Likely conditioning matrix:

-

Further information on the conditioning matrix:

A 9:1 BFS/OPC matrix is expected to be used.

Waste Packaging:

Likely container type:	Container	Waste packaged (vol%)	Waste loading (m³)	Payload (m³)	Number of packages	Estimated start date for packaging
	500 l drum	100.0	0.20	0.47	32	-

Range in container waste loading:

Other information on packaging and conditioning: Appropriate plant to be provided at the station in accordance with EDF Energy strategy.

Conditioned density (t/m³): ~ 1.7
 Conditioned density comment: Density may vary from 1.62 to 1.72 t/m³.

Management Routes:

Disposal Route	Stream volume %	Raw density t/m³	Start date
Expected to be consigned to a Near Site, Near Surface Disposal Facility (Scotland)	= 100.0		
Expected to be Non-NSD HAW managed under Scottish Government's policy			
Expected to be disposed to LLW Vaults NRS Dounreay			
Expected to be consigned to the Geological Disposal Facility			
Expected to be consigned to a Near Surface Disposal Facility			
Expected to be consigned to the LLW Repository			
Expected to be consigned to a Landfill Facility			
Expected to be disposed On-Site			
Expected to be managed by In-Situ Disposal			
Expected to be consigned to an Incineration Facility			
Expected to be consigned to a Metal Treatment Facility			
Expected to be Out of Scope			
Expected to be recycled / reused			
Disposal route not known			

Classification codes for waste expected to be consigned to a landfill facility:

Opportunities for alternative disposal routing: No

Baseline Management Route	Opportunity Management Route	Stream volume (%)	Opportunity Confidence	Comment
-	-	-	-	-

RADIOACTIVITY

Source: Spent Ion Exchange resins. Contamination by activation products will be a main source of activity.

Uncertainty: Activity based on Torness data.

Measurement of radioactivities: Activity based on Torness data.

Chemical form of radionuclides: H-3: The waste is expected to contain some tritiated liquor.
 C-14: Not determined
 Cl-36: Not determined
 Se-79: Not expected to be significant
 Tc-99: Not expected to be significant
 I-129: Not expected to be significant
 Ra: Not determined
 Th: Not determined
 U: Not determined
 Np: Not determined
 Pu: Not determined

WASTE STREAM 3M08 Active Effluent Ion Exchange Material									
Nuclide	Mean radioactivity, TBq/m³				Nuclide	Mean radioactivity, TBq/m³			
	Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code		Waste at 1.4.2025	Bands and Code	Future Arisings	Bands and Code
H 3	1.32E-06	C C 2	2.67E-06	C C 2	Gd 153				
Be 10					Ho 163				
C 14	4.25E-07	C C 2	4.25E-07	C C 2	Ho 166m				
Na 22		4		4	Tm 170				
Al 26		4		4	Tm 171				
Cl 36	6.10E-07	C C 2	6.10E-07	C C 2	Lu 174				
Ar 39					Lu 176				
Ar 42					Hf 178n				
K 40	4.10E-06	C 3	4.10E-06	C 3	Hf 182				
Ca 41					Pt 193				
Mn 53					Ti 204				
Mn 54	6.94E-04	C C 2	1.16E-02	C C 2	Pb 205				
Fe 55	1.49E-02	C C 2	1.22E-01	C C 2	Pb 210	3.80E-05	C C 2	5.78E-05	C C 2
Co 60	1.31E-03	C C 2	4.94E-03	C C 2	Bi 208				
Ni 59					Bi 210m				
Ni 63	2.03E-03	C C 2	2.03E-03	C C 2	Po 210				
Zn 65	4.30E-06	C 3	8.39E-05	C 3	Ra 223				
Se 79					Ra 225				
Kr 81					Ra 226	9.70E-05	C C 2	9.70E-05	C C 2
Kr 85					Ra 228				
Rb 87					Ac 227				
Sr 90	2.33E-04	C C 2	3.24E-04	C C 2	Th 227				
Zr 93					Th 228				
Nb 91					Th 229				
Nb 92					Th 230				
Nb 93m					Th 232				
Nb 94	4.40E-06	C 3	4.40E-06	C 3	Th 234	6.70E-05	C C 2	2.01E-03	C C 2
Mo 93					Pa 231				
Tc 97					Pa 233	6.50E-06	C C 2	1.95E-04	C C 2
Tc 99					U 232				
Ru 106	5.00E-05	C 3	7.40E-04	C 3	U 233				
Pd 107					U 234	1.10E-07	C C 2	1.10E-07	C C 2
Ag 108m	2.00E-06	C C 2	2.00E-06	C C 2	U 235	5.80E-08	C C 2	5.80E-08	C C 2
Ag 110m	4.50E-06	C C 2	8.55E-05	C C 2	U 236				
Cd 109					U 238	6.50E-08	C C 2	6.50E-08	C C 2
Cd 113m					Np 237	1.90E-05	C C 2	1.90E-05	C C 2
Sn 119m					Pu 236				
Sn 121m					Pu 238	2.00E-05	C C 2	2.24E-05	C C 2
Sn 123					Pu 239		6		6
Sn 126					Pu 240	3.23E-05	C C 2	3.23E-05	C C 2
Sb 125	2.50E-05	C 3	1.65E-04	C 3	Pu 241	1.31E-03	C C 2	2.42E-03	C C 2
Sb 126					Pu 242	8.30E-07	C C 2	8.30E-07	C C 2
Te 125m					Am 241	9.04E-05	C C 2	9.04E-05	C C 2
Te 127m					Am 242m				
I 129					Am 243				
Cs 134	1.16E-03	C C 2	9.94E-03	C C 2	Cm 242	4.20E-07	C C 2	9.90E-06	C C 2
Cs 135					Cm 243	5.85E-06	C C 2	8.07E-06	C C 2
Cs 137	3.39E-02	C C 2	4.64E-02	C C 2	Cm 244	5.85E-06	C C 2	9.65E-06	C C 2
Ba 133					Cm 245				
La 137					Cm 246				
La 138					Cm 248				
Ce 144	1.40E-05	C C 2	2.47E-04	C C 2	Cf 249				
Pm 145					Cf 250				
Pm 147	2.65E-04	C C 2	1.86E-03	C C 2	Cf 251				
Sm 147					Cf 252				
Sm 151	1.60E-05	C C 2	1.78E-05	C C 2	Unsp a	1.42E-03	C C 2	1.42E-03	C C 2
Eu 152	5.30E-06	C 3	1.01E-05	C 3	Unsp b/g	7.19E-05	C C 2	7.19E-05	C C 2
Eu 154	4.22E-05	C C 2	1.08E-04	C C 2	Total a	1.69E-03	*	1.71E-03	*
Eu 155	2.56E-05	C C 2	1.05E-04	C C 2	Total b/g	5.62E-02	*	2.06E-01	*

Bands (Upper and Lower)

A a factor of 1.5
B a factor of 3
C a factor of 10
D a factor of 100
E a factor of 1000

Note: Bands quantify uncertainty in the mean radioactivity.

Code

1 Measured activity
2 Derived activity (best estimate)
3 Derived activity (upper limit)
4 Not present
5 Present but not significant
6 Likely to be present but not assessed
7 Present in significant quantities but not determined
8 Not expected to be present in significant quantity
* Total calculated from the 114 declared radionuclides